

TILLITE AND VARVED SLATE ERRATICS IN NORTHERN RICHLAND COUNTY, OHIO

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INTRODUCTION

Most exposures in Ohio of the Wisconsin till show it to be only moderately pebbly and cobbly, with only occasional boulders. At a few places, however, over areas of one to several square miles, unusual concentrations of cobbles and boulders are evident, both in the till and on the surface. One such concentration is in Blooming Grove Township, northern Richland County, northeastern part of Crestline quadrangle (Fig. 1), where the drift is unusually bouldery and the surface of some fields is so covered with boulders that, as in New England, the boulders must be cleared away before the fields can be plowed. Boulders, which have been dragged out of the fields, are piled up in rows along the fences, roads, and gullies and in one case a stone wall has been built around a barnyard.

Most of the boulders in the drift in Ohio are granite or granite gneiss, but near Rome, in Blooming Grove Township, a high percentage are banded slate. Two tillite boulders were discovered three-fourths mile east of Blooming Grove Township, in Cass Township. Both of these localities lie within the Wabash moraine (Leverett, Pl. 13; White, p. 36), just east of the divergence of that moraine from the more northerly Ft. Wayne moraine.

THE TILLITE BOULDERS

The conglomerate boulders are located one and one-fourth miles southeast of Shiloh, in northwest Section 13, Cass Township, one-fourth mile south of Planktown. They lie at the southeastern corner of a barnyard, at the west edge of State Route 613, 200 feet north of the small stream which crosses the road. The position is shown in Fig. 2.

One boulder (Fig. 3) which lies on the highway right-of-way is 46 inches in the longest dimension and 36 inches in the shortest. It is irregular and subangular to subround in shape. It is made up of particles from 4 inches to sand grain size,

loosely packed, the spaces filled with fine grained crystalline material. The pebbles, which are subangular to subround, are of pink granite, gray granite, pink granite gneiss, gray granite gneiss, vein quartz, greenstone, and dark greenish schist. The matrix is fine grained: in part, dark blackish green material,



Fig. 1. Index map showing location of Blooming Grove Township, Richland County.

now probably mainly chlorite and other ferromagnesian silicates; and in part a crystalline material resembling fine grained arkose.

The second boulder lies 18 feet south-southwest of the first, just outside the line of highway right-of-way. It appears to be more than half underground, but the visible portion measures

58 by 42 inches. It has the same composition as the first boulder, except that its cobbles are smaller and the proportion of matrix higher.

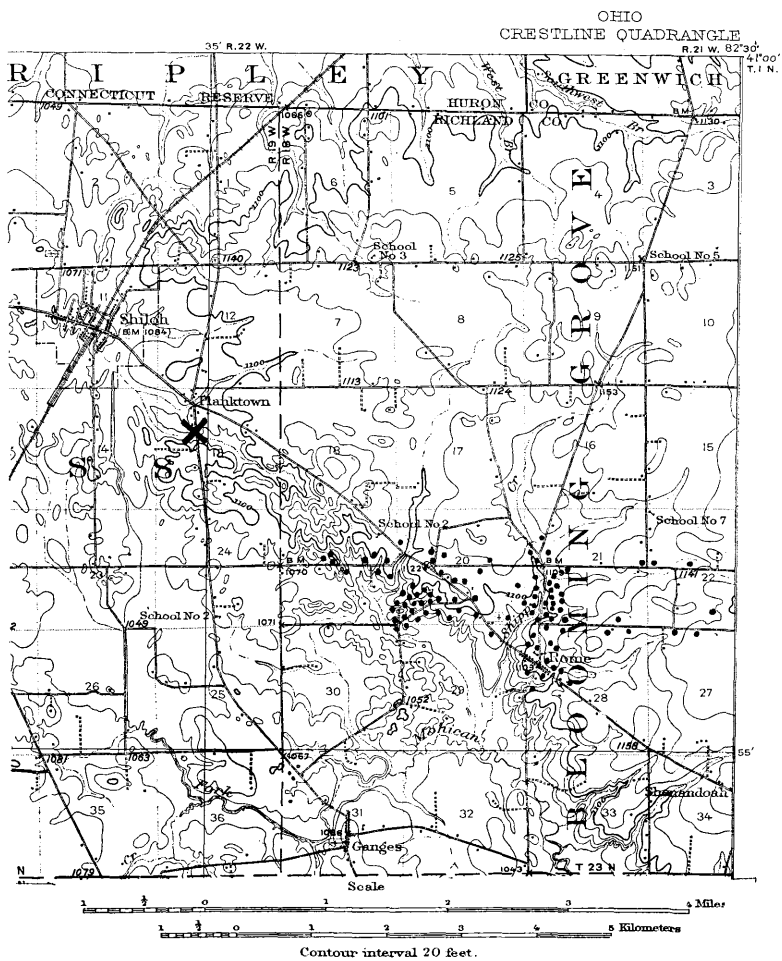


Fig. 2. Northeastern part of Crestline quadrangle. Dots show relative concentration of varved slate erratics. Cross shows location of tillite boulders.

Two almost rectangular blocks of banded slate similar to those concentrated farther east lie between the two tillite boulders. One is 20 by 24 by 15 inches, the other 8 by 10 by 7 inches. The slate is made up of alternating thin dark and light bands. The slaty cleavage is parallel to the bedding planes.

To identify definitely two isolated boulders far removed from original relationships as tillite is difficult or impossible but the writer here interprets them as consolidated ancient (Precambrian) till. The material resembles that of the Squantum tillite, near Boston, Massachusetts, and appears to resemble the Cobalt tillite as described by Coleman (pp. 220-226).

Other boulders of conglomerate which have been interpreted as Precambrian tillite have been found at various places within the drift in Ohio. A large tillite boulder lies in front of Orton



Fig. 3. Tillite boulder on west border of State Highway No. 613, in northwest Section 13, Cass Township, one-quarter mile south of Planktown.

Hall, Ohio State University. Dr. Wilber Stout, state geologist, has preserved in his garden fireplace a small tillite boulder which was dug from the drift in Clintonville (North Columbus). The late Professor Richard C. Lord discovered a large tillite erratic three miles southwest of Gambier, in Pleasant Township, Knox County, about 300 yards west-northwest of the 1194 roadfork which is one-half mile northwest of Graham School. Tillite boulders, while very uncommon in Ohio drift, have been found at widely separated intervals over the state. Professor J. Ernest Carman (personal communication, 1938) estimates that he has seen approximately twenty tillite erratics in his field work in Ohio.

SLATE ERRATICS

A marked concentration of slate erratics occurs in Blooming Grove Township in the vicinity of Rome, as shown in Fig. 2. The spacing of the dots in Fig. 2 shows the relative density of the slate erratics, each dot representing many erratics. The slate is present in all sizes from pebbles to blocks three feet long. Many of the pieces are beautifully striated on one or more sides, but they are mainly rectangular, and show very little



Fig. 4. Varved slate and igneous erratics in pile at edge of field, southwest Section 20, Blooming Grove Township.

rounding. In this area the slate is so common that it has been used for flagstone walks and for a few walls.

The slate is banded, with alternating black and light gray, straight, even bands (Fig. 4). The light bands are the coarser, in a few specimens being almost a fine grained quartzite, indicating that the original material was silt, and not clay. The thickness of the light bands in various pieces varies from the thickness of a sheet of paper to a half inch. The dark bands are very fine textured, the thickness varying from a sixteenth to a quarter inch. In some blocks slaty cleavage is well developed, often parallel to the bedding planes.

This slate is believed to have been originally varved clay and silt laid down in Precambrian glacial lakes, probably upon till which later became tillite. The coarse, thicker layers were laid down in the summer (Antevs, pp. 1-6): the darker, finer, thinner layers in the winter. After deposition, the ancient glacial material was compacted and metamorphosed. Such banded slate, in close relationship to tillite, is known to outcrop in Ontario and Quebec (Coleman, p. 234).

SOURCE

All igneous and metamorphic erratics in Ohio must necessarily have been brought from Canada by the Wisconsin or earlier ice sheets. The main area of Cobalt tillite lies in Ontario (Coleman, p. 225) too far west to be the point of origin for the boulders in Richland County, but the small area of Cobalt series at Lake Chibougamau in Quebec (Coleman, pp. 224-225), which lies approximately northeast of Richland County, is not an impossible source for these boulders. As Coleman points out, the centers of the "Labrador" ice sheet were in northern Quebec, east of James Bay (Coleman, pp. 16, 17, map p. 22). The farthest east outcrop of Huronian tillite is east of a line drawn from "Labradorean" centers 2 and 3 (Coleman, map p. 22). Therefore the tillite boulders in Ohio could have come from known Canadian outcrops. Since varved slates are associated with many known tillite outcrops it is quite likely that the tillite and varved slate erratics were brought to Ohio from the same Canadian locality.

The writer wishes to point out only a possibility that the erratics herein described are from Cobalt rocks, not to press the probability of such an origin.

No explanation of unusual concentrations of erratics in restricted localities is entirely satisfactory. Some concentrations may be due to the breaking up in the last part of the transportation process of a single huge erratic. Wolford (pp. 362-367) describes an erratic containing 225,000 cubic feet of limestone in the Illinoian till near Oregonia, Warren County, which was carried at least several miles. If this huge erratic had been carried farther it might have broken into smaller pieces, thus giving a concentration of smaller limestone erratics at some locality. Large limestone erratics in Columbiana County are described as transported from another county (Stout and Lamborn, p. 47). The Niagaran limestone erratics

concentrated in a small area in southeastern Morrow County, shown the writer by Professor Lord, may be parts of a single huge erratic which was broken up not far away. That the concentration of slate erratics in northern Richland County may be due to the breaking up of a single huge slate erratic, not far north of the present slate location, is an hypothesis that must be considered.

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